water-soluble polymer on the surface of the support on which the ink-receptive layer is provided.

Claim 13. The ink-jet recording material according to claim 1, wherein the ink-receptive layer contains a cross-linking agent of the hydrophilic binder.

Claim 14. The ink-jet recording material according to claim 13, wherein the cross-linking agent is boric acid or a borate.

REMARKS

Reconsideration and allowance of the subject application are respectfully requested.

Claim 1 has been amended as shown above, by essentially incorporating the subject matter of claim 6 into claim 1. Claim 6 has accordingly been cancelled.

Claim 5 has been amended as shown above, in order to ensure antecedence basis with base claim 1, in view of the amendment to claim 1.

Claim 10 has been added as supported by the specification including at page 12, lines 14-34. Claim 11 has been added as supported by the specification including at page 13, lines 10 to 16. Claim 12 has been added as supported by the specification including at page 9, line 35 to page 10, line 16. Claims 13 and

14 have been added as supported by the specification including at page 19, line 22 to page 20, line 10. No new matter has been added.

Before addressing the rejections of the claims in view of the cited references, the applicants provide the following comments to provide the Examiner with a better understanding of the present invention.

When fumed silica having an average primary particle size of 5 to 50 nm is used, a recording material having good ink absorption property and high glossiness can be obtained (see page 12, line 36 to page 13, line 8 of the present specification). However, there is a defect in such a recording material wherein the aggregation of secondary particles is weak and the surface of an ink-receptive layer is easily flawed. This is believed to result from a smaller number of silanol groups on the surface of the silica particles, particularly when compared to that of a wet type silica.

The above described flaws at the ink-receptive layer occurs at the portion near to a winding core (a portion to which a relatively high pressure is applied) of a roller to which a recording material is wound on the winding core.

The present invention addresses the above mentioned problem (flaws) by improving a support wherein both surfaces of a base paper are coated by a polyolefin resin (hereinafter referred to as "a resin-coated paper").

A basic technical concept of the present invention is to relax the pressure applied to the ink-receptive layer and absorb it by the resin-coated paper. Thus, the resin-coated paper for such a purpose provides (as for example recited in present claim 1) flexibility (a cushioning property) to the resin-coated paper, a

ratio of a total thickness (B+C defined in claim 1) of the polyolefin resin layers (hereinafter merely referred to "resin layers") on the both surfaces to a thickness (A) of a base paper is made small and a density of the base paper is also made small.

The relationship between the thickness of the base paper and the thickness of the resin layers is described in detail at page 8, line 33 to page 9, line 14 of the present specification and with regard to the density of the base paper, at page 6, lines 14 to 20 of the specification.

A preferred embodiment of the present invention (see claim 2), recites a thickness B of the resin layer at the side of the ink-receptive layer, which is made thin in the range of 8 μm or more to less than 20 μm. According to this embodiment, the cushioning property of the resin-coated paper is significantly improved. Moreover, in consideration of preventing curl and improving cushioning property, the above thickness B is preferably thinner than a thickness C of the resin layer at the opposite side (as described at page 7, line 22 to page 8, line 7 of the present specification).

The above described resin coated paper for use in the present invention has a high cushioning property, so that it can relax the pressure applied to the ink-receptive layer thus preventing the aforementioned flaw at the ink-receptive layer.

Next, the resin-coated paper to be used in the present invention is explained. A resin-coated paper is a paper support on both surfaces of which are coated with a polyolefin resin such as a polyethylene resin, and the like. The

base paper is paper made by beating a pulp which is a starting material of paper, mixing the pulp with various kinds of fillers, and making paper by use of a paper machine. A base paper which is a resin-coated paper for general use as a support of an ink-jet recording material, is subjected to various kinds of treatments to heighten smoothness of the paper surface. Such treatments include a calender treatment. The calender treatment is a treatment of pressing paper by rollers to apply a pressure to the paper. By heightening the pressure of the calender treatment, the paper is more greatly pressed to increase surface smoothness but at the same time the density of the paper is also increased. Accordingly, the density of the base paper of the resin-coated paper for general use in an ink-jet recording material is higher than 1.05 g/m^3 This value is an upper limit of the present invention as described at page 6, lines 4 to 20 of the present specification.

Additionally, the reason for using a resin-coated paper in place of the conventional paper is to heighten glossiness (see page 2, line 17 to page 3, line 2 of the present specification). To heighten glossiness of a recording material, it is effective to increase the smoothness of the base paper of the resin-coated paper and to increase the thickness of the resin layers as mentioned above.

However, a base paper having high smoothness and thicker resin layers lowers the cushioning property of the resin-coated paper, whereby flaws are likely caused at the ink-receptive layer as described above.

On the other hand, fumed silica gives high glossiness because the particle size of fumed silica is extremely small. Accordingly, by using fumed silica, even

when smoothness of the base paper is lowered to a certain extent and the density is also lowered, a higher glossiness can be obtained.

A combination of the resin-coated paper and the fumed silica employed in the present invention acts to overcome their defects with their merits according to each, and thus, the combination of the above two elements is an extremely beneficial technique.

Moreover, in the further preferred embodiment of the present invention, an amphoteric surfactant is a component of the ink-receptive layer. The presence of the amphoteric surfactant in the ink-receptive layer acts to further prevent the occurrence of the aforementioned flaws, as described at page 17, lines 1 to 10 of the present specification.

Additionally, in the further preferred embodiment of the present invention, the fumed silica is present in the ink-receptive layer in an amount of 50 to 90% by weight. More preferably, a hydrophilic binder is a component of the ink-receptive layer in an amount of 10 to 25% by weight. As described above, in an ink-receptive layer having a higher ratio of fumed silica and a lower ratio of the hydrophilic binder, the number of voids increases in the ink-receptive layer, so that ink-absorption increases. However, when the ratio of the hydrophilic binder becomes lower, the flaws increase in the ink-receptive layer. In this sense, the resin-coated paper of the present invention is more effective.

By adding a cross-linking agent of the hydrophilic binder to the ink-receptive layer of the present invention, the strength of the ink-receptive layer

increases and thus prevents the occurrence of flaws. Among the cross-linking agents, boric acid or a borate is particularly preferred.

Turning now to the specific cited prior art, the applicants respectfully traverse the rejection of claims 1-4 and 7-9 under 35 USC 102(b) in view of Kojima et al.

The applicants further traverse the rejection of claim 5 under 35 USC 103(a) in view of Kojima et al.

The teachings of Kojima do not anticipate the presently claimed invention or make it obvious.

Kojima describes densities of a low density polyethylene and a high density polyethylene to be used in a resin layer of a resin-coated paper (see column 5, lines 15 to 21 of reference) and such density is different from the density of a base paper. The resin-coated paper is a material in which resin layers are provided on both surfaces of the base paper. The base paper and the resin layers are significantly different materials. Certainly, the density of the base paper (0.60 to 1.05 g/m^3) of the present invention is no where disclosed or suggested in Kojima.

As stated above, the base paper of the resin-coated paper is paper made of a pulp, and thus, the base paper of the presently claimed invention does not contain a polyethylene resin.

One of the reasons that the density of the present base paper is intentionally designed to be small, i.e., 0.60 to 1.05 g/m^3 is to provide a cushioning property to the support thereby relaxing pressure applied to the ink-

receptive layer as described above. The density of the base paper of the present invention is thus designed to be smaller than that of the base paper for the conventional resin-coated paper.

Kojima provides no characteristic feature related to a support for use in ink-jet recording materials. The working examples of Kojima demonstrate this fact. A conventional support is used in the working Examples of Kojima. A typical support, used in this field has been used. For example, in Examples 1-24, 26, 31, 37-46 and 50, a resin-coated paper is used. In Examples 25, 27, 30 and 49, a polyethylene terephthalate film is used. In Examples 28, 32-36, 47 and 51-57, a wood-free paper is used. In Examples 29 and 48, an art paper is used.

An important difference between the presently claimed invention and the teachings of Kojima is use of fumed silica in the present invention. Kojima no where discloses or suggests the use of the fumed silica of the presently claimed invention.

A specific problem caused by ultrafine particles such as fumed silica, i.e., flaws at the ink-receptive layer, is specifically addressed with respect to the present invention, but never disclosed or discussed in Kojima. The applicants submit that the presently claimed invention can not be expected from reading the teachings of Kojima.

Accordingly, the applicants submit that the presently claimed invention is not only unanticipated by Kojima under Section 102(b) but further is unobvious under Section 103(a) in view of Kojima.

The applicants respectfully traverse the rejection of claims 5 and 6 under 35 USC 103(a) over Kojima et al. in view of Kobayashi et al.

The teachings of Kojima have been thoroughly discussed above and the presently claimed invention clearly distinguished from the teachings of Kojima.

The teachings of Kobayashi do not remedy the deficiencies of Kojima.

Kobayashi discloses the use of fumed silica. Importantly, however, Kobayashi discloses a recording material using a transparent support. This is quite different from a recording material which uses a resin-coated paper as in the presently claimed invention.

The applicants submit that a person of ordinary skill in the art would not consider combining the teachings of Kobayashi with those of Kojima when contemplating the presently claimed invention. There is no suggestion or motivation to combine the two references to result in the presently claimed invention.

Accordingly, the applicants assert that the combination of references is not tenable and should be withdrawn.

Moreover, even if a person of ordinary skill in the art were to consider the combined teachings of the references, such combination would not make the presently claimed invention to be obvious, as clearly shown above. This is particularly true since a resin-coated paper is not disclosed in Kobayashi.

Accordingly, the presently claims invention is fully allowable under Section 103(a) in view of the cited references.

The applicants respectfully traverse the rejection of claims 1-9 under 35 USC 103(a) over Kaneko et al., in view of Romano et al. and further in view of Kojima et al. None of the cited references make the presently claimed invention to be obvious.

Kaneko discloses a resin-coated paper and fumed silica. However, the density of the base paper (as in the presently claimed invention) for the resin-coated paper is not disclosed or suggested in Kaneko. The content disclosed at the paragraph of Kaneko relates to densities of a low density polyethylene and a high density polyethylene to be used in the resin layers, so that it is not a density of the base paper (see above discussion that distinguishes Kojima et al).

Romano discloses densities of various polyethylenes in Table 1 at column 6 of the reference. However, such teachings are irrelevant to the density of the base paper of the presently claimed invention.

The teachings of Kojima have been thoroughly discussed above and the presently claimed invention clearly distinguished from the teachings of Kojima.

The teachings of Kaneko and Romano do not remedy the deficiencies of Kojima.

Moreover, The applicants submit that a person of ordinary skill in the art would not consider combining the teachings of Kojima and Ramano with those of Kaneko when contemplating the presently claimed invention. There is no suggestion or motivation to combine the three references to result in the presently claimed invention.

Accordingly, the applicants assert that the combination of references is not

tenable and should be withdrawn.

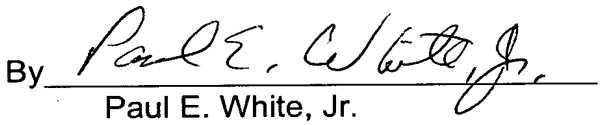
Moreover, even if a person of ordinary skill in the art were to consider the combined teachings of the references, such combination would not make the presently claimed invention to be obvious, as discussed above.

Thus, the applicants submit that the presently claimed invention is fully allowable under Section 103(a) in view of the cited art.

In view of the above, it is believed that this application is in condition for allowance and a Notice to that effect is respectfully requested.

Respectfully submitted,

Manelli Denison & Selter, PLLC

By 

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Proposed Amendments To Claims 1 and 5 Showing Deletions And Insertions.

Claim 1. (Amended) An ink-jet printing material comprising a support in which both surfaces of a base paper are covered by a polyolefin resin, and an ink-receptive layer containing [inorganic fine particles] fumed silica having an average primary particle size of 5 nm to 50 nm and a hydrophilic binder provided on the support, wherein the ink-jet recording material satisfies a relation of {(B+C)/A} = 0.15 to 0.45, where A is a thickness of the base paper; B is a thickness of the polyolefin resin layer at the surface on which the ink-receptive layer is provided; and C is a thickness of the polyolefin resin layer at the opposite surface to that on which the ink-receptive layer is provided, a density of the base paper is 0.60 to 1.05 g/cm^3, A is 50 to 300 μm, and B is 5 to 25 μm.

Claim 5. (Amended) The ink-jet recording material according to claim 1, wherein the ink-receptive layer contains the [inorganic fine particles] fumed silica in an amount of 50 to 90% by weight.